

# Parotid Gland Imaging



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## KEYWORDS

- Parotid imaging • Pleomorphic adenoma • Biologic imaging • Image-guided biopsy
- Parapharyngeal space

## KEY POINTS

- Ultrasound is a readily available initial imaging modality for the workup of parotid space tumors in the pediatric population.
- Computed tomography and MRI are essential for characterization of parotid space lesions and certain features may provide clues to the underlying histology.
- Biologic imaging is a new frontier that can offer insight into the behavioral characteristics of tumors.
- Image-guided biopsies offer a minimally invasive approach for histologic diagnosis.

## INTRODUCTION

Given the location and anatomy of the parotid gland, lesions in the parotid gland can often remain indolent. This is true of lesions in the deep portion of the parotid gland or exophytic lesions extending into the parapharyngeal space. As a result, many parotid lesions are incidental findings on imaging for other causes (neck trauma, headaches). The workup of incidental parotid lesions and patients presenting with specific symptoms related to their parotid gland, that is, facial pain or cheek mass, are some of the reasons for dedicated parotid gland imaging.

## IMAGING MODALITIES

### *Conventional Radiographs*

The use of plain radiographs and sialography are nearly obsolete in the current era of modern imaging. Only 60% of parotid calculi are seen on radiographs and determining whether they are parenchymal versus ductal is very limited.<sup>1</sup> Computed tomography (CT) had a nearly 10-fold increased sensitivity to sialolith detection over conventional radiographs.<sup>2</sup>

### *Sialography*

Before cross-sectional imaging, sialograms were important for identifying lesions based on displacement of the ductal system and for assessing processes resulting

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**Abbreviations**

ADC	Apparent Diffusion Coefficient
BV	Blood Volume
CP	Capillary Permeability
CT	Computed Tomography
CTP	Computed Tomography Perfusion
FNA	Fine-Needle Aspiration
PPS	Parapharyngeal Space
US	Ultrasonography

in ductal obstruction. After the advent of CT, sialograms played a role in differentiating subacute and chronic sialdenitis and autoimmune causes such as Sjögren syndrome.<sup>3</sup> Serology has superseded the diagnostic accuracy of conventional sialography.<sup>2</sup>

**MR Sialography**

MR sialography is a useful alternative to sialograms. It is performed with a heavily T2-weighted high-resolution fast spin echo sequence (TR 3600/TE 800) with fat suppression with a 4- to 6-cm slab thickness and a surface coil or multichannel head coil.<sup>4</sup> This technique offers a noninvasive means of assessing the ductal anatomy with comparable sensitivity to conventional sialography for large stone detection. Small stones, those approximately 3 mm, are more difficult to identify on MRI. MRI is also limited by the time required for the single sequence acquisition and the susceptibility to motion degradation for this sequence. For select cases, MR sialography can be added to the MRI parotid study.

**Ultrasound**

Another noninvasive tool for examining the parotid gland is high-resolution ultrasonography (US). In the United States, US is underused,<sup>5</sup> whereas in Europe and Asia it is often the first diagnostic test for parotid pathology workup.<sup>6,7</sup> Given that the bulk of the parotid gland is superficial, US serves as a readily available screening test for parotid pathology. Because most clinicians are familiar with cross-sectional anatomy, a sound understanding of the ultrasonographic appearance of the parotid space and spatial relationships is necessary for successful imaging of the parotid gland. For pediatric patients, it is the preferred diagnostic test given the concerns for radiation exposure and the low incidence of primary tumors in this population.<sup>2,8</sup>

Wide-band linear transducers of 5 to 12 MHz are used for examination.<sup>9</sup> Most superficial lesions are best evaluated with frequency probes greater than 7.5 MHz with evaluation of the deeper portions of the gland best evaluated with lower linear frequency probes (5-7 MHz) given the need for deeper penetration. This also forms a significant limitation for parotid US because lesions in the deep portion of the parotid gland, at the stylomandibular notch, or parapharyngeal space are obscured by the mandible. For these lesions, cross-sectional imaging is recommended<sup>10,11</sup> (Fig. 1).

**Conventional Angiography**

Catheter-based angiography has limited role in workup of parotid region tumors. Aside from the rare instances of a large arteriovenous malformation or hemangiomas that may require preoperative embolization, most parotid space tumors are not excessively hypervascular. With the advent of high resolution multislice CT scans, preoperative planning can be performed adequately with cross-sectional imaging. Even for the aforementioned hypervascular lesions, a CT angiography is adequate for preoperative

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